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Explaining the gap between policy aspirations and implementation: The case of university knowledge transfer policy in the United Kingdom

by

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Explaining the gap between policy aspirations and implementation: The case of university knowledge transfer policy in the United Kingdom

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Abstract

Implementing policies that build upon the generic aspirations set out in government documents can be a challenging task for implementation agencies. We argue that, particularly when policies deal with complex and ambiguous issues, an increasing gap may open up between government-set objectives and the instruments used for policy implementation and evaluation, as the former are characterized by increasing breadth and ambiguity, while the latter become progressively narrower in scope.

We propose a conceptual framework to explain why these processes may occur, and, as an example, we analyze the policies in support of university-industry knowledge transfer in the United Kingdom. Their evolution shows how the government's policy aspirations have become broader, while implementation has increasingly relied upon instruments that depend on narrowly defined measures of output attainment. The result is a system of performance measurement and funds allocation that is quite far from the government's aspirations.

Keywords: Policy implementation, policy evaluation, knowledge transfer, university-industry interactions, Higher Education Business and Community Interaction Survey, Higher Education Innovation Fund

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1. Introduction

Implementing policies that build upon generic aspirations set out in government documents (such as white papers and reviews) can be a challenging task for implementation agencies (Bach et al, 2014; Flanagan et al, 2011). Especially when the policy concerns complex issues characterized by a high level of ambiguity, the gap between the government's aspirations and the instruments used in policy implementation can widen over time, leading to an increasing mismatch between them. This is due, we argue, to pressures in different directions – government aspirations become broader and more ambiguously defined, while implementing agencies increasingly benchmark their targets to the achievement of narrowly defined outputs (often quantitative indicators) which are usually very loosely related, if at all, to the government's objectives.

We structure our explanation of the processes underpinning the growing gap between policy aspirations and implementation on the basis of a conceptual framework, which builds upon and integrates several arguments from the literature on policy implementation. Then, in order to illustrate how these processes can play out in practice, we present the case of policies in support of university-industry knowledge transfer in the United Kingdom (UK). We highlight the evolution of policymakers' aspirations through a qualitative meta-synthesis of policy documents issued since the 1990s, and we map the parallel evolution of two key policy instruments supporting university knowledge transfer in this country: the Higher Education Innovation Fund (HEIF), which is allocated to universities on the basis of their knowledge transfer performance, and the Higher Education Business and Community Interaction (HEBCI) survey which is used to determine how the above mentioned fund should be allocated.

The paper is organized as follows. In section 2, we discuss some theoretical issues surrounding policy implementation and the process through which general policy aspirations are formulated and articulated into specific initiatives; we then propose a conceptual framework to explain the growing gap between policy aspirations and implementation. In section 3 we describe the methodology. In section 4, we illustrate the growing gap between policy aspirations and implementation by: first, exploring the evolution of government policies for university-industry knowledge transfer in the UK since the 1990s, through a review of the policy and research documents and the

policy initiatives that have shaped the creation of a permanent stream of funding to support university-industry knowledge transfer; and, second, examining the evolution of the HEIF and of the HEBCI instruments. Section 5 presents some general implications of our analysis for policy development.

2. Explaining the growing gap between policy aspirations and implementation

2.1. Key issues in policy implementation

Policy implementation focuses on the relationship between the expression of the government's intention to do something (or to stop doing something) and the actual result obtained (O'Toole, 2000). While the process of policy implementation is crucial for the attainment of policy objectives, its study has not led to generalizable theories regarding the factors for achieving success (Lee, 2011; Linton, 2002) and has often remained marginal in policy studies (Robichau and Lynn, 2009; Sabatier, 2007) so much so that much greater understanding of the nature of policy implementation processes is still needed in order to help policymakers devise the appropriate instruments to reach their objectives (Kapsali, 2011).

Two main alternative approaches to implementation have been highlighted. Top-down approaches assume that policy objectives can be fully specified by policymakers, and that successful implementation can be carried out through the set up of appropriate instruments. This centralized perspective emphasizes the ability to control actors through coercive and normative means. It ignores the role of local agency on the part of actors implementing the policy; the focus is on administrative processes, and disregards the political aspects of implementation (Matland, 1995; Van Meter et al., 1975). It has been suggested that this approach often leads to failure in implementation due to the unrealistic expectations that the actors involved in the implementation will behave as prescribed, whereas in practice the top-down imposition of objectives and processes often leads to resistance, disregard or pro-forma compliance on the part of local actors (Berman, 1980, Mole, 2002).

On the other hand, bottom-up approaches pay attention to the objectives, strategies, activities and formal and informal relationships between the actors tasked with implementing the policy and seek to exploit them in order to structure actions at the

local level. A recent development in this perspective involves the study of the networks of relationships between the actors involved (Holman, 2008; Linton, 2000; Meek, 2005) in order to investigate patterns of behaviour, analyse interdependencies and construct best practice models (Calia et al., 2007), an approach which however has not yet led to precise normative directions for implementation (Kapsali, 2011). A problem with bottom up approaches is that allowing too much autonomy at the local level may lead actors to pursue individual goals at the expense of the overall policy objective (Matland, 1995).

Moving beyond the dichotomy between top-down and bottom-up approaches, third-generation implementation approaches have attempted to propose a synthesis of both perspectives (Barrett, 2004). Sabatier (1986, 2007) argued for the importance of policy learning and highlighted the need for policy to be analysed in cycles of more than 10 years. Elmore (1982 and 1985) proposed an iterative model of implementation according to which general objectives are set but actual implementation tools are adapted and redesigned according to the specific problems emerging from the local level.

Several authors have argued that, in the course of policy implementation, general aspirations are expressed in the form of objectives, or expected outcomes, of the policy. Outcomes measure efficacy (Omachonu and Nanda, 1989) in terms of the results generated by intervention (Schalock and Bonham, 2003), usually captured by changes in behaviour and performance (Patton, 1997). It has also been observed that in practice the focus on outcomes is often replaced by a focus on outputs (Robichau and Lynn, 2009). Outputs do not measure the actual changes in behaviour and performance that result from the intervention, but measure the quantity, quality, and timeliness of the goods and services that are the tangible result of an intervention. As such, they are far easier to measure compared to outcomes, which are often intangible (Omachonu and Nanda, 1989).

However, the extent to which the outputs that are being measured support the intended outcomes is debatable: sometimes, outputs and outcomes are only loosely related because, for the sake of measurability, information about intangible outcomes is not captured. A comprehensive approach to explaining the gap between policy objectives and implementation has been proposed by Matland (1995) who suggested that four types of implementation process are possible according to the degree of ambiguity and conflict surrounding it: administrative implementation (with low

ambiguity and low conflict) where the outcome is determined by resources; political implementation (with low ambiguity and high conflict) where the outcome is decided by power; experimental implementation (with high ambiguity and low conflict) where contextual decisions dominate the process, and finally symbolic implementation (with high ambiguity and high conflict) where the strength of local level coalitions determines the outcome. Matland argues that, while in situations of low ambiguity and low conflict the process of implementation can be seen as linear, with a strong ability of the government to direct the process by issuing top-down normative constraints on behaviour, under conditions of greater ambiguity and conflict the government is not able to provide such direction, and negotiations among the different stakeholders involved in the implementation process take on greater importance.

With ambiguous objectives and ambiguous means and with high level of conflict, policy implementation can be reduced to the pursuit of targets increasingly defined by limited sets of quantitative indicators, which become "symbols" of complex policy objectives. The crystallization of discussion around a limited number of quantitative measures provides a way to overcome the parties' conflicting objectives, as the indicators are sufficiently detached from these objectives to appear uncontroversial. The precision of the indicators also provides a way to overcome ambiguity, even though this occurs at the expense of the possibility to check whether actual objectives are being achieved.

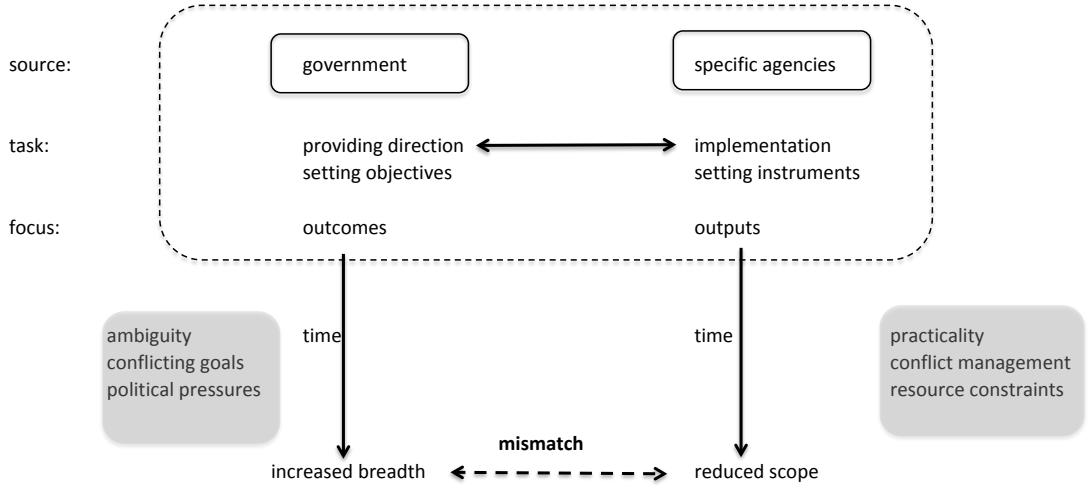
Interestingly, Molas-Gallart and Castro-Martinez (2007) have suggested that such processes are at play precisely in the case of university knowledge transfer policies such as those that we analyse in this study: they argue that the context in which these policies are developed is characterized by high ambiguity and high conflict, and that indicators become the symbols around which the implementation discussion converges.

2.2. Explaining the growing gap between policy aspirations and implementation: a conceptual framework

We provide a conceptual framework, building and integrating several arguments from the literature on policy implementation, to explain the growing gap between policy aspirations and implementation. While previous studies on policy making often focus on either agenda setting or implementation (Zahariadis, 2007), we attempt to explain

how both processes can develop in different directions, leading to a growing mismatch between them. The framework is illustrated in Figure 1. An explanation of the framework follows below.

Figure 1: A framework explaining the gap between policy aspirations and implementation



The framework compares the tasks and focus of two general categories of actors, the government (which could be at different levels, for example national, regional or local) that sets the policy objectives, and the agency (or agencies) charged with implementing the policy through the setting up of appropriate instruments. In fact, while the policy process involves a complex set of elements that interact over time with multiple levels of agency (Sabatier, 2007), it is generally possible to identify two main centres of agency with different functional focus, either policy development or implementation. Each of these centres can comprise, naturally, more than one organization.

The framework suggests that, over time, the definition of objectives and the setting up of instruments are subject to different pressures, which lead to increasing mismatch between them, especially when the policy concerns complex and ambiguous issues (Zahariadis, 2007): on the one hand, the objectives, and related outcomes, defined by government defines become more broader, while on the other hand, the policy implementation focuses on achieving outputs that are progressively narrower in scope.

The left hand side of the figure illustrates the process of agenda setting on the part of the government. When the policy concerns complex issues, whose unfolding depends on the many actions and interactions of multiple stakeholders acting at different ontological levels (for example, when the processes that the policy intends to affect depend on the actions of - and the interactions between - individuals, organizations, and institutions) ambiguity is likely to be high (Mccreadic et al, 2008). Feldman defines ambiguity as "a state of having many ways of thinking about the same circumstances or phenomena" (1989, p.5). This is usually accompanied by a high degree of interpretive flexibility, where each actor can perceive the issue differently in time and place (Flanagan et al., 2011; Rametsteiner and Weiss, 2006). Unlike uncertainty, ambiguity does not reduce when more information becomes available (Wilson, 1989). More information makes understanding more complex and provides more room for alternative interpretations. The more is known about the issue, the more ambiguous the understanding becomes, and different views and interpretations may emerge.

Political pressures may also set in to take into account the interests of previously unaccounted-for stakeholders that are somehow affected by the policy issue under consideration (Ouyang, 2006) whose interests and objectives may be mutually conflicting. To accommodate, and possibly reconcile, different and contrasting views and interests about the issue that are emerging over time, the policymaker sets increasingly broad and ambiguous objectives: that is, the objectives, and the related expected outcomes, are expressed in increasingly vague and abstract terms, they are more broadly defined, and at times they can be contradictory (Zahariadis, 2007).

The right hand side of the figure illustrates the process of instrument definition on the part of the implementation agency. The task of setting up appropriate policy instruments when policy objectives are broad and ambiguous is particularly difficult. In the course of implementation the focus on achieving policy objectives, and related outcomes is often replaced by a focus on outputs, that is, on achieving results that are measurable in terms of quantity, quality, and timeliness of the goods and services delivered (Robichau and Lynn, 2009). Typically, the outputs considered tend to be in the form of quantitative indicators (Molas-Gallart and Castro-Martinez, 2007).

The focus on outputs fulfils a political role, since it allows for some implementation decisions to be taken even when the guidance provided by the government is ambiguous (Nohstedt and Hansen, 2010); Zahariadis, 2007). Moreover it allows the

parties to overcome the presence of conflicting goals by focusing on measures that are easy to define and implement and appear objective and uncontroversial (Ackill, et al, 2013; Matland, 1995; Molas-Gallart and Castro-Martinez, 2007; Sharkansky, 2002). However, the decisions that will be taken are likely to be far from the stated policy objectives: indeed, Zahariadis (2005) provided examples of implementation systems that, with a higher level of objective ambiguity, dramatically reduce efficiency of delivery.

Over time, the scope of the outputs that underpin the policy instruments may be narrowed down even further: the role of quantitative indicators in the implementation process may become increasingly central, and the number and variety of indicators considered may be reduced. The focus on progressively narrower outputs is due, on the one hand, to the above-mentioned need to take some implementation decisions despite the increasing breadth and ambiguity of the policy objectives. On the other hand, it also responds to powerful practical concerns with convenience and cost effectiveness. Implementation agencies face constraints in the amount of financial and cognitive resources they can dedicate to their tasks. Implementing 'holistic' policy approaches requires processing a lot of information, which is costly in terms of the time and people involved (Kirk et al., 2007): the use of simple output indicators as measures of result achievement makes it easier to collect information and to implement incentive and reward systems based on more streamlined mechanisms, which require fewer financial and cognitive resources. Once these indicators are in place, their use often persists over time. In fact, agencies tend to use techniques and approaches that they already know, drawing on common usage and capabilities and favoured approaches: this leads them to consider relatively few "manageable" options (Kirk et al., 2007) and results in path dependency in the chosen solutions.

In Section 4, we present a case study on the policies in support of university-industry knowledge transfer in the UK, which illustrates the growing gap between policy aspirations and implementation. We employ a qualitative meta-synthesis approach to contextually show how the policy aspirations outlined by the government have been stated in increasingly broad and ambiguous terms, while the implementation process has increasingly relied upon the use of quantitative indicators and streamlined procedures with progressively narrower scope. This has resulted in an increasing mismatch between the government's broader aspirations and the narrower approaches used to achieve them (Bach et al, 2014; Kapsali, 2001).

3. Methodology

In order to illustrate how the framework presented in the previous section explains the growing gap between policy aspirations and implementation, we performed a case study on policies supporting knowledge transfer for universities in the UK. We scrutinized 59 different policy documents, produced by different organizations, with different motives and incentives, in order to achieve maximum variation sampling (Bowen, 2009; Weed, 2008).

The documents, mentioned in the national archives and HEFCE website, were selected through a systematic literature review, which provided a 'guiding tool' (Lee, 2009) that allowed us to shape the search according to our research focus and objectives. We considered policy documents published by the Department for Trade and Industry (DTI, 1970-2007), the Office of Science and Technology (OST, 1992-2007), the Department for Education and Skills (DFES, 2001-2007), the Department for Innovation, Universities and Skills (DIUS, 2007-2009), the Department for Business, Enterprise and Regulatory Reform (BERR, 2007-2009), the Department for Business Innovation and Skills (BIS, since 2009), as well as documents published by the Higher Education Funding Council for England (HEFCE), the agency charged with the implementation of policies in support of universities' knowledge transfer activities.

The first set of documents we analysed includes 10 commissioned independent academic research reports that raised issues, provided evidence and gave general policy recommendations. The second set of documents, policy reviews (12 documents issued since 1998), addressed a more specific identification of problems shaped in policy-relevant terms: this is where evidence was interpreted in order to set general policy objectives. The third set of documents consists of government white papers (9 documents), which provided the government's response and reformulation of such policy objectives, by announcing specific actions in line with their interpretation of what the policy objectives were. The final set consists of 28 documents and news releases that defined the details of the policies' implementation. .

We then followed a qualitative meta-synthesis approach in analysing the documents (Timulak, 2009) in order to understand the meaning in the context (Mishler, 1979). This is important to provide an avenue for looking for commonalities (Finfgeld, 2003;

Thorne et al, 2004) and contrasts (Bowen, 2009; Paterson et al., 2001) while not overlooking the context. To perform this qualitative meta-synthesis, we followed a descriptive interpretative strategy (Elliott and Timulak, 2005) and paid particular attention to: the objectives mentioned in the policy documents issued by the government; the objectives and instruments mentioned in the documents issued by implementation agencies; changes in the actual instruments used to drive and assess the policies, starting from the mid-1990s. We obtained some useful insights into how policy objectives have become broader and more ambiguous over time, offering opportunities for diverging interpretations at several points.

In order to address the notion of refocusing of outcomes onto outputs, and their narrower scope over time, we analyzed the evolution of the HEBCI survey and of the HEIF allocation system since they were first introduced in the late 1990s. This analysis allowed us to illustrate how these instruments evolved to become narrower in scope.

4. University-industry knowledge transfer policy in the UK: the evolution of objectives and instruments

4.1. The challenges for university-industry knowledge transfer policy

In today's economic environment, universities are required to collaborate with industry in order to create value that is able to impact the economy and society at large (Grady and Pratt, 2000). By enhancing university-industry collaboration, it is argued, the new knowledge economy is able to accelerate the creation and distribution of knowledge to a new level (Howlett, 2010; Vorley and Lawton-Smith, 2007). The emergence of the "second academic revolution" (Etzkowitz, 2003) - where the university's engagement in knowledge transfer has become a "third mission" (Nelles and Vorley, 2010) on a par with its traditional teaching and research missions - is largely due to the government supporting and even strengthening the links between universities, industry, and society at large.

Policymakers are currently seeking ways to make knowledge transfer between universities and industry more effective. However, in doing so they encounter several challenges. First, a growing number of studies showcase a wide variety of

mechanisms through which knowledge can be transferred to external parties (Bekkers and Bodas Freitas, 2008; Hewitt-Dundas, 2012; Laursen and Salter, 2004; Lawton-Smith, 2007). The key policy challenges lies in determining which of these mechanisms should be encouraged, and how to promote knowledge transfer support initiatives that do not hamper some knowledge transfer channels while promoting others. Second, if universities are to be incentivised to engage in their third mission activities, it is important to establish ways to assess and reward universities' performance in this area. What approaches can be used to measure engagement and success? To what extent do they cover the wide variety of mechanisms through which knowledge can be transferred, and generate appropriate incentives for universities (Rossi and Rosli, 2014)?

Overall, there is a need for synergy between government policy aspirations, which promote and shape the state of the university knowledge transfer eco-system, and the policy interventions that are implemented in practice. However, our analysis shows that the gap between aspiration and implementation in knowledge transfer policy has actually widened over time.

4.2. The evolution of government's policy aspirations: increasing breadth

The UK government's concern with supporting university-industry collaboration began in the late 1970s, when a widespread debate on the UK's presumed failure to exploit research emerged (Grady and Pratt, 2000). Initial interventions to answer the problem were fragmented, without any synergies among government, university and industry. There was a need for clarity on the aspirations of the government, and in 1993 a white paper titled "Realising our potential" (OST, 1993) was published, which highlighted a gap between the UK's excellence in science and technology and its relative weakness in exploiting them to economic advantage (OST, 1993) and emphasized the importance of partnerships between industry, government and the science base. The white paper led to a re-configuration of government support for science and technology. The move of the Office of Science and Technology from the Cabinet Office to the Department for Trade and Industry in 1995 provided an avenue to a more coordinated national policy on technology and knowledge transfer. This white paper also inspired a rationalization, towards the end of the 1990s, of various Government Departments' funding schemes to support university-business

interaction, into a single funding stream supporting universities in the development of knowledge transfer activities, which became permanent in the early 2000s.

The election of the Labour government in 1997 saw a renewed focus on the building up of research infrastructure, with an increase in capital investment following years of dwindling investment in this area[1] (Grady and Pratt, 2000; Lupton et al., 2013). Also, concern for improved economic competitiveness and social welfare led to the support for universities' engagement with business and the community.

The Dearing Report (National Committee of Enquiry Into Higher Education, 1997), which was the first major review in 35 years of the UK's higher education system, stressed the importance of partnerships between university and industry, requiring universities to be responsive towards industry engagement, especially in commercialising science. The report envisaged that there was a need for a more flexible, accessible approach to business engagement, and identified a number of core services that universities could provide to business to encourage knowledge transfer (Howlett, 2010). This academic transition identified universities as the central focus for economic development (Etzkowitz and Leydesdorff, 2000). The white paper "Our Competitive Future: Building a Knowledge Driven Economy" (DTI, 1998) emphasised the role of government, universities and businesses in improving the UK's competitiveness, and drew attention to government's ability to promote enterprise and stimulate innovation by rewarding universities for strategies and activities to enhance interaction with business. The white paper "Excellence and Opportunity" (DTI, 2000) highlighted the crucial role of government in encouraging the exploitation of knowledge and new technologies.

In the early 2000s, particular attention was paid to the regional dimension of universities' engagement with businesses and the community. The "Future of Higher Education" white paper (DES, 2003) proposed a more regional focus for universities to support economic development. In 2000 the government created a new Regional Innovation Fund worth £50 million a year to enable Regional Development Agencies (RDAs) to support clusters and incubators and networking among scientists, entrepreneurs, managers and financiers. The Lambert Review (HM Treasury, 2003)

[1] Lupton et al. (2013) estimate that expenditure in capital services in the period 1997-2010 grew by approximately 59 percentage points.

emphasized that RDAs should be given targets to promote links between business and university. The Fifth Parliamentary Report by the Select Committee on Science and Technology (2003) recommended HEFCE not only to work with the RDAs, the universities and other interested parties, but also to develop measures to assess the effectiveness of knowledge transfer between universities and business, with a particular focus on their regional dimension, to complement the national quality measures for teaching and research. The report suggested the implementation of appropriate metrics, to ensure "sustained commitment by HEIs to supporting business so that they develop the motivation, capacity, capability and commitment to interact professionally and effectively with regional development in all its breadth" (Select Committee on Science and Technology, 2003, fifth report).

After the mid-2000s, the Governments' aspirations for the role of universities in supporting economic growth have broadened further. It has been recognized that not all universities play the same role in supporting economic growth. The white paper "Opportunity for all in a world of change" (DTI/DFES, 2005), recognised the crucial role of universities in the economy as powerful drivers of innovation and change, but claimed that different universities have different contributions to make: some as world class centres of research excellence and players in global markets; others primarily as collaborators with local businesses and communities, and with regional bodies. Institutions must choose the role which best suits their strengths. Public funding should encourage such choice, by providing incentives for institutions to become more entrepreneurial, build closer links with business and the community, and have proper arrangements for exploiting the results of their work. In line with this more diverse approach to the nature of universities' knowledge transfer activities, the Sainsbury Review (HM Treasury, 2007) recommended that funds dedicated to supporting university knowledge transfer should be spread more widely across the sector, since different universities engage in different types of knowledge transfer activities.

The role of Intellectual Property Rights (IPR) on commercialisation of research was addressed in the Gowers Review (HM Treasury, 2006) and was enhanced further by the Hargreaves Review (Hargreaves, 2011) which highlighted the importance for universities and SMEs to realise the potential of IP especially copyright. The UKIPO also joined the bandwagon by providing guidelines on Intellectual Asset Management

for universities. The Saraga report (2007) highlighted that focus of income generation for universities on the part of the government and public funders may lead to an overemphasis on IP from negotiations which may not be beneficial to the wider economy.

The "Innovation Nation" white paper (DIUS, 2008) argued for the importance of building a supporting ecosystem for university-industry interactions that involved also the Research Councils, the Technology Strategy Board (TSB) and RDAs, universities and businesses. Emphasis was increasingly placed on creating collaborative relations and two-way exchange of knowledge as opposed to one-way knowledge transfer. The Wilson Review (Wilson, 2012) emphasised the importance of adopting a holistic view of collaboration between universities and business. It stated that there was a need to assess the impact of the programme on actual knowledge transfer, which should not be measured purely on the basis of economic gain but also consider policy development (Wilson, 2012).

Over time, the regional focus was progressively abandoned. Following the publication of the white paper "Local Growth: Realising Every Place's Potential" (BIS, 2010), and in parallel with the change to a Conservative-Liberal Democrats coalition government, the RDAs were closed down (31 March 2012) and new business-led Local Enterprise Partnerships (LEPs) between local authorities and businesses were established. By April 2014 all areas of England are now covered by a LEP, taking the total to 39 (BIS Committee, 2014). The Witty Review (BIS, 2013) highlighted the importance of the LEP as an economic growth pathway, not only supporting the local region where knowledge transfer is strongly encouraged, but more generally in the UK. Moving away from the regional focus, funding allocation should support LEPs partnering with local universities which align their distinctiveness with opportunity, understanding the locality's competitive advantage and leveraging the natural assets of their co-location towards a seamless growth agenda (BIS, 2013). The publication of BIS 2014 report on international benchmarking of the UK science and Innovation system also offers a more comprehensive picture on the importance of university-business collaboration in UK innovation ecosystem and addresses the importance of the structures and incentives in innovation ecosystem evaluation.

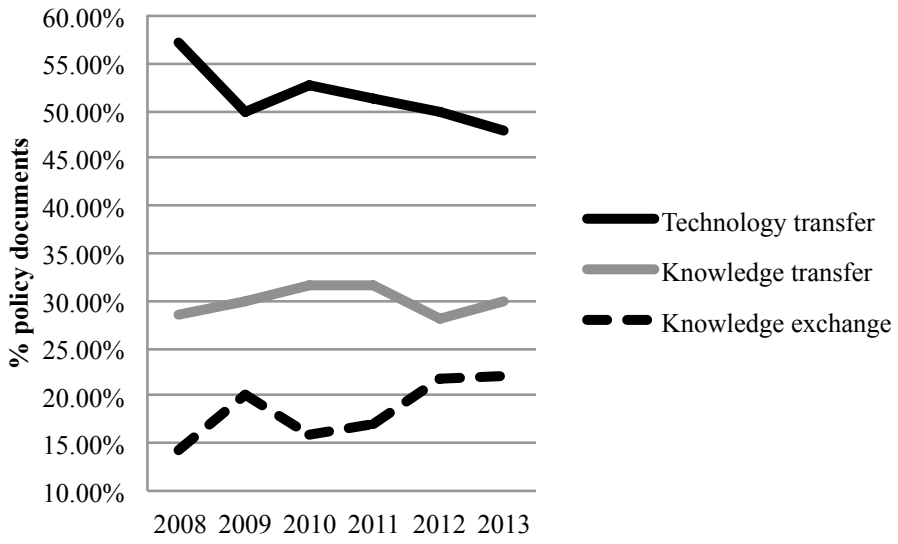
Summarizing, the analysis of government white papers and policy reviews dealing with university knowledge transfer since the mid-1990s reveals that the government's policy objectives have progressively become broader and more ambiguous:

- In the late 1990s-early 2000s, the documents suggested that universities would be expected to transfer knowledge to their local/regional communities. The focus was mainly on technology transfer in the form of commercialization of patented technology and direct contracts between universities and business, focusing on science and engineering. This was also reflected in the terminology used, as the most widely used term was "technology transfer" (e.g. National Committee of Enquiry Into Higher Education, 1997; DTI, 1998).
- Since the mid-2000s, the term "knowledge transfer", emphasizing the not necessarily technological nature of the knowledge transferred by universities, began to be used widely (e.g. DES, 2003; HM Treasury, 2003); the term in fact encompasses a broader range of activities than the commercialization of research results and the performance of research contracts. It was also acknowledged that different institutions can play different roles in knowledge transfer, with some producing research excellence and interacting with large global companies, others providing skills and knowledge to their local communities. The focus broadened from science and engineering to the entire spectrum of academic disciplines, including the social sciences and the arts and humanities. The limitations of patents as vehicles of knowledge transfer were increasingly acknowledged.
- Since the late 2000s, the term "knowledge exchange", which emphasizes the bi-directional and collaborative nature of the process of interaction between universities and businesses (or other stakeholders) began to emerge (e.g. DIUS, 2008; Wilson, 2012 and BIS, 2013). This coincided with the adoption of an even broader perspective, according to which universities were expected to be part of complex ecosystems of innovation characterized by collaboration and exchange among a variety of stakeholders (Andersen, Brinkley and Hutton, 2011).

By way of illustration, Figure 1 shows the share of UK policy documents that include the words "technology transfer", "knowledge transfer" and "knowledge exchange"

between 2008 and 2013 (data have been obtained by searching all policy documents produced by UK government ministerial departments and other public bodies). Even in this relatively short period, it can be seen how the former term has decreased in importance while "knowledge transfer" and "knowledge exchange" have entered progressively greater use. These concepts, and especially the latter, are more comprehensive but also much more vague and ambiguous (with respect to the types of activities that should be supported, the types of benefits that these activities should generate, and who should primarily benefit from them), than the concept of technology transfer which prevailed in the preceding years.

Figure 2: The relative importance of the words "technology transfer", "knowledge transfer" and "knowledge exchange" in UK policy documents



Source: Authors' elaboration based on information available from https://www.gov.uk/government/publications (last accessed July 2014).

The table reported in Appendix 1 summarizes the key policy documents discussed in this section, their main purpose and objectives (where the documents deal with broader higher education issues, we focused only on purposes and objectives relating to university-industry knowledge transfer) and presents some comments on their evolution over time.

4.3. The evolution of policy instruments: narrower scope

In parallel with the setting out of government aspirations in white papers and reviews, several policy initiatives launched since the mid-1990s sought to improve links between higher education and industry.

The University for Industry (Ufi) initiative, launched in 1998, was a promotional, brokerage and commissioning agency which aimed to mobilise the expertise and energy of government, business and education towards meeting the needs of the market by providing people with information, and ensuring the availability of high quality programmes and products (Grady and Pratt, 2000). Ufi's learning services were delivered through Learndirect, a public-private partnership founded in 2000 which provided access to courses sponsored under the EU's ADAPT programme (Hillage et al., 2001)

In 1999, a package of measures called the Knowledge Exploitation Programme was launched with the objective to support universities and publicly funded research institutes to engage in various forms of knowledge transfer to business. In England, these included:

(i) The Higher Education Reach-out to Business and the Community (HEROBAC) Fund. Sponsored by DFES and DTI and allocated by HEFCE, the HEROBAC fund initially was set at £60m over four years and was due to become a permanent third stream of funding, specifically aiming to develop the capability of universities to engage with business and the wider community, by putting into practice appropriate organisational and structural arrangements.

(ii) The Science Enterprise Challenge (SEC). This initiative supported entrepreneurially oriented education and training through networks of universities. It supported innovation culture in universities, to make them more relevant to business. Allocated through competition and managed directly by the government Office of Science and Technology (OST), £45 million was made available over the period 1999-2004.

(iii) The University Challenge Seed Fund provided access to seed funds to exploit science and engineering research outcomes and support the creation of university spin-outs. The scheme was funded by Wellcome Trust, Gatsby Charitable Foundation

and the UK Government. Universities receiving the fund had to provide 25% of the total fund from their own resources. £45 million was allocated in the first round of the competition in 1999, and £15 million more in 2001.

In the early 2000s, HEFCE also introduced a monitoring system collecting information about universities' knowledge transfer activities, based on the HEBCI survey. In the following, we show how the output information contained in the HEBCI survey has progressively gained increasing importance in the context of university knowledge transfer policy, while the content of the survey has become focused on a narrower range of activities and quantitative indicators have taken on greater importance. This has in turn allowed HEFCE to use the information provided in the survey as a basis to build more streamlined formulas for its funds allocation system.

The origins of the HEBCI can be traced back to the late 1990s, when, following the introduction of HEROBAC, a need emerged to monitor the knowledge transfer activities of universities. Some preliminary surveys, which formed the basis upon which the HEBCI was eventually developed, had already been commissioned in the mid to late 1990s (Howells, Nedeva and Georghiou, 1998), but their scope was limited to relatively few universities. These surveys placed a strong emphasis on qualitative information and had a strong focus on measuring regional interactions.

In order to systematise data collection, HEFCE was put in charge of carrying out a comprehensive survey covering all higher education institutions in the UK. The first edition of the survey, called Higher Education and Business Interaction (HEBI) was launched in 2001, referring to the period 1999-2000. It was commissioned by HEFCE to the Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne (Charles and Conway, 2001).

In 2003, the Select Committee on Science and Technology report suggested that the measurement of university interaction with businesses should not only provide incentives for HEIs to engage with business and society but also highlight the focus activities that make a difference for economic development. To this end, the metrics used should recognise that: (a) the interactions will be of many different types; (b) engagement must not be constrained by regional boundaries; and (c) meaningful assessment will require a long-term and, in part, subjective view. While these

recommendations were welcomed by HEFCE, in practice, however, the indicators used in the survey have become progressively narrower especially starting from the third edition of the survey, carried out in 2003 and referring to 2001/2002.

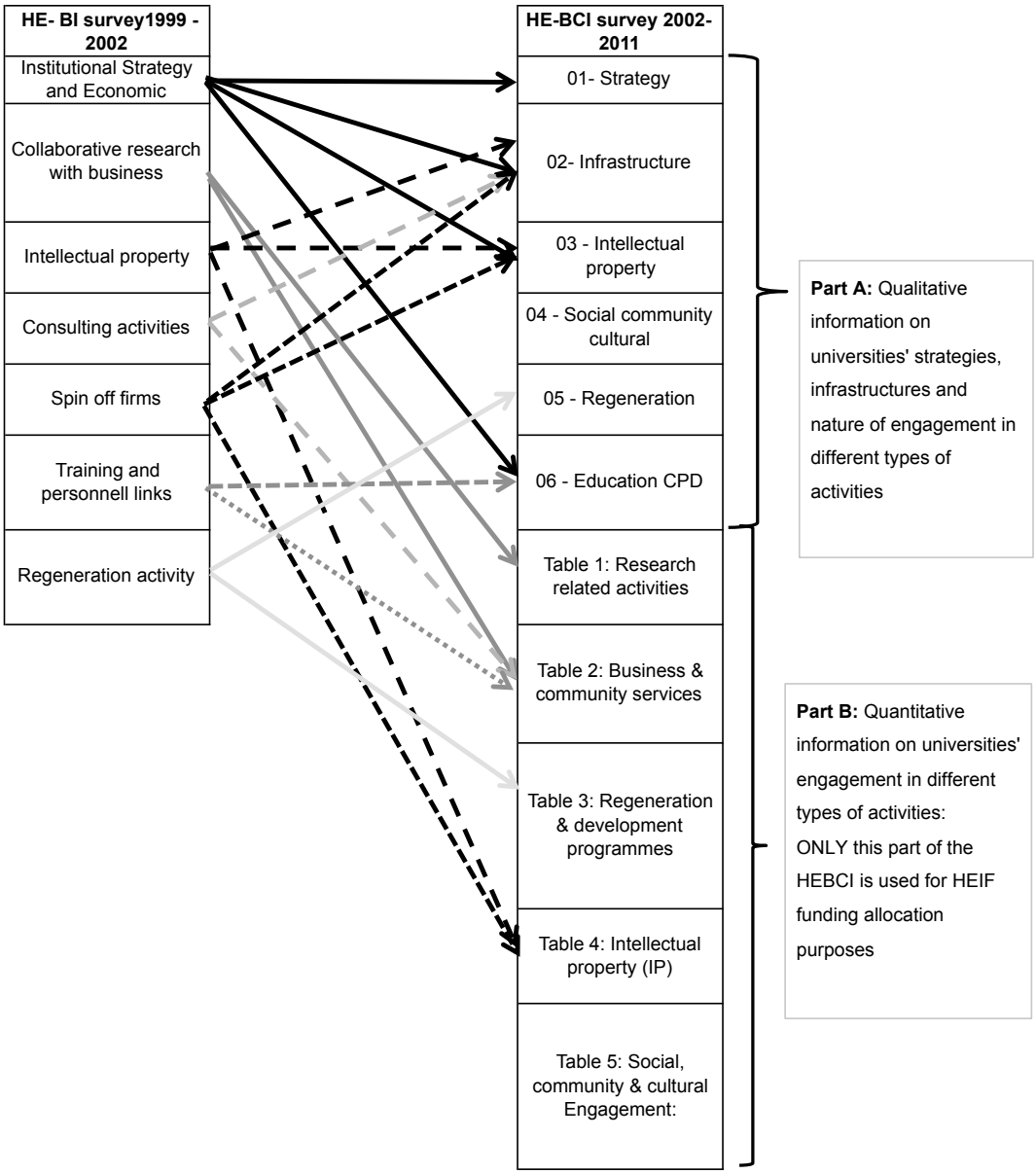
Figure 3 shows how the structure of the survey (now called Higher Education Business and Community Interaction, HEBCI) changed drastically in 2002, with the survey being split into two parts, one dedicated to the collection of qualitative information about universities' knowledge transfer infrastructures and strategies (part A), and one dedicated to the collection of quantitative information on their knowledge transfer activities (part B). The figure shows how the topics present in the first two editions of the survey (1999-2002) were reallocated into two main sections (part A and part B). Although the information collected starting from 2002 was initially not too dissimilar from that collected in previous editions of the survey, in practice collating all the quantitative information in a separate section made it easier to detach it from qualitative information about the context in which it was generated, and we can argue that this facilitated the transition toward a system in which the only part that actually "matters" for policy implementation is the quantitative part.

Over time, there has also been a progressive change in the importance of the different thematic areas measured in the survey. Figure 4 shows the relative importance of different themes, measured on the basis of their weight in the survey (share of the overall number of questions). In terms of relative importance, four main themes gained ground: intellectual property, provision of facilities and equipment services, and contract research and consultancy. Other themes declined in importance, albeit slightly: strategic objectives, spinoff companies, and regeneration programmes. A couple of themes appeared to lose considerable ground: infrastructure and policy, and skills provision. The theme "other events", having to do with social, community and cultural engagement, was only introduced in 2001/2002 and, after a period of increasing importance, it stabilized.

Therefore, even though policy documents increasingly encouraged a focus of a broad set of knowledge transfer activities, emanating from a variety of academic disciplines, in practice the survey has attributed progressively greater importance to a few types of activities particularly likely to generate income to the university, many of which are also particularly associated with technological and scientific subjects. The loss of importance of regeneration programmes, spinoff companies and skills provision

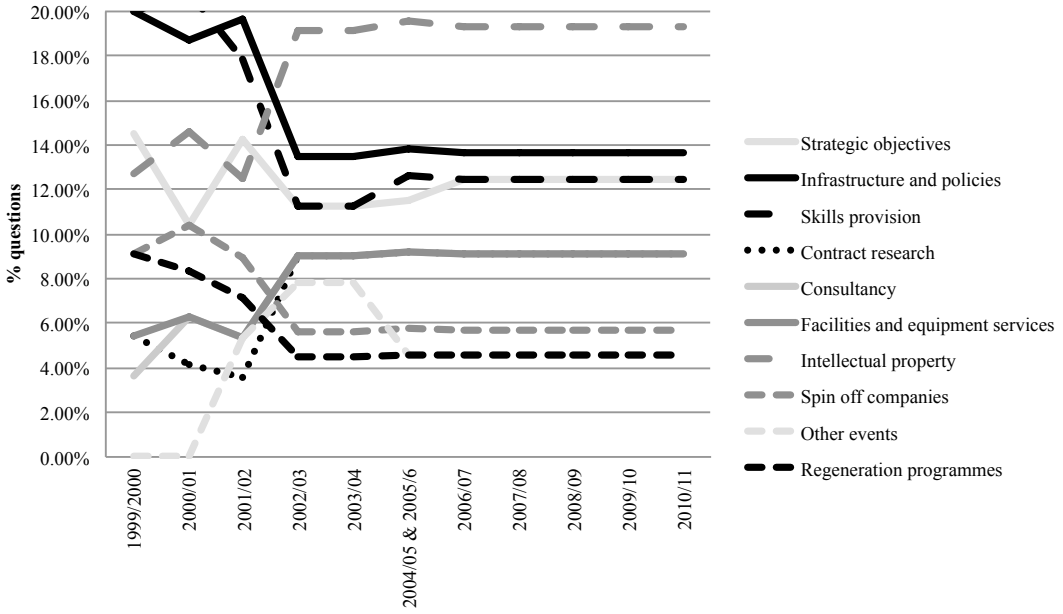
themes reflects a shift away from the regional dimension of knowledge transfer, with progressively greater importance attributed to the achievement of "excellence" on a national scale rather than to the involvement in interactions with the local community. The reduced focus on strategies and policies also suggests a shift away from more intangible aspects of engagement and towards more tangible, quantifiable outputs.

Figure 3: Main changes in the structure of the HEBCI



Source: Authors' own elaboration based on HE-BI and HEBCI questionnaires, available from http://www.hefce.ac.uk/data/ (last accessed July 2014).

Figure 4: The relative importance of various thematic areas in the survey, over time

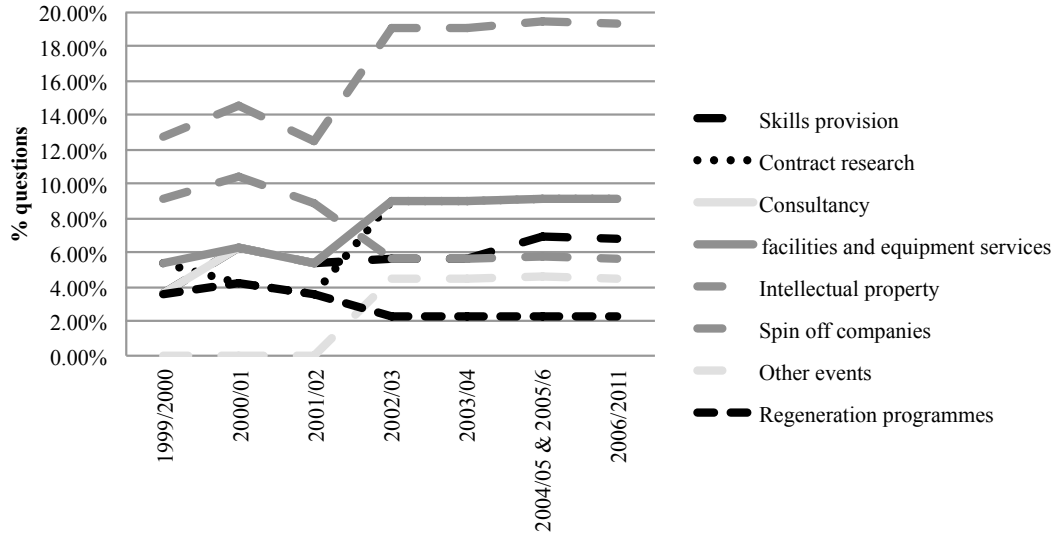


Source: Authors' own elaboration based on HE-BI and HEBCI questionnaires, available from http://www.hefce.ac.uk/data/ (last accessed July 2014).

Also if we focus only on the quantitative part of the survey, as in Figure 5, we find that the relative importance of various thematic areas has changed: rising importance of intellectual property, provision of facilities and equipment services, consultancy and contract research, and, again, progressive loss of importance of spinoff companies and regeneration programmes.

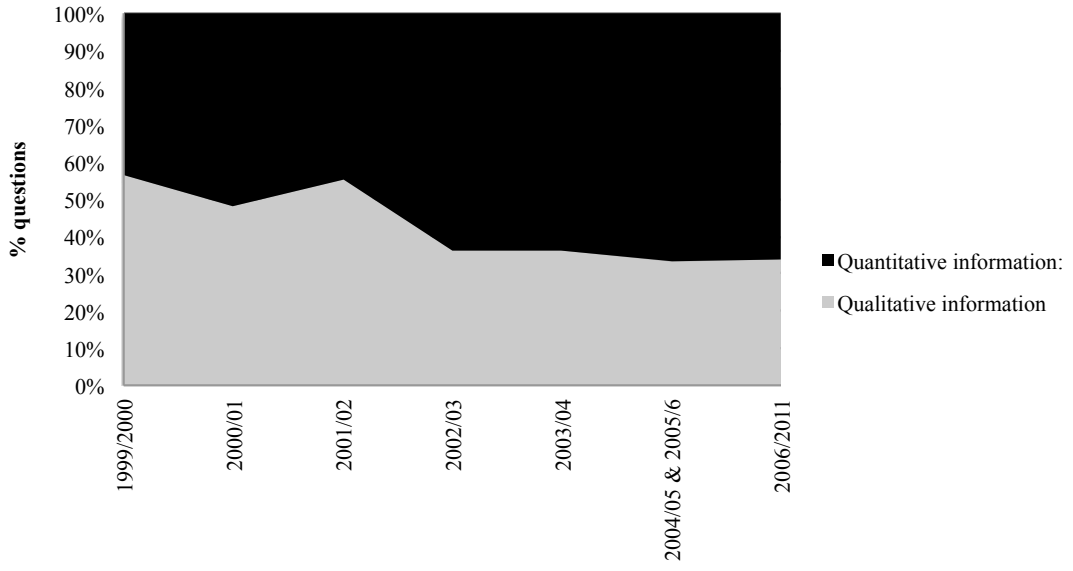
If we consider the split between quantitative and qualitative indicators, Figure 6 clearly shows that over time, and in particular since 2002, the share of questions collecting quantitative information has increased.

Figure 5: Focusing only on the quantitative indicators: The relative importance of various thematic areas in the survey, over time



Source: Authors' own elaboration based on HE-BI and HEBCI questionnaires, available from http://www.hefce.ac.uk/data/ (last accessed July 2014).

Figure 6: The growing importance of quantitative measures



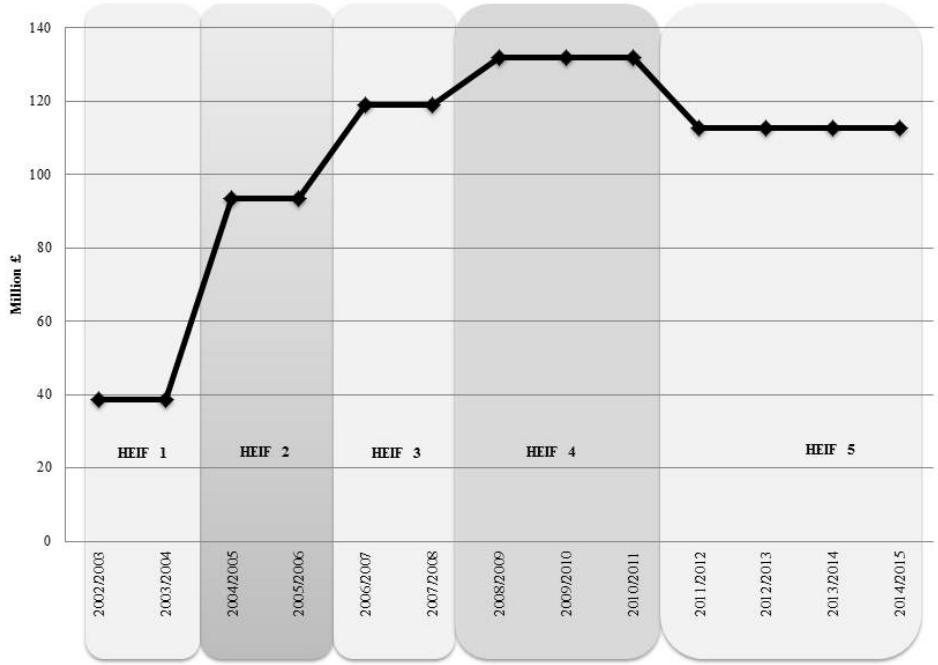
Source: Authors' own elaboration based on HE-BI and HEBCI questionnaires, available from http://www.hefce.ac.uk/data/ (last accessed July 2014).

In parallel with the introduction of the HEBCI survey, a new stream of funding to support university-industry knowledge transfer was announced following the Government's 2000 Spending Review, in order to continue and develop the work of the HEROBAC initiative: the Higher Education Innovation Fund (HEIF)[2] . The HEIF was launched in 2001/2 as a partnership between DTI/OST, HEFCE and the Department for Education and Skills (DFES). This established a third stream of funding, to sit alongside the core funding to university institutions for research, and for learning and teaching. The HEIF was supposed to facilitate a more strategic approach to supporting universities, some of which attributed more importance to supporting local industry and to other focus areas, than to basic research (Select Committee on Science and Technology, 2003). The introduction of the HEIF also brought about a streamlining of the set of initiatives targeting universities' knowledge transfer funding, as in 2003 the activities originally funded by the Science Enterprise Challenge and University Challenge Seed Fund were brought within the remit of the HEIF.

The following figure shows the evolution of the amount of funding dedicated to the HEIF in England since its inception in 2001. After a marked increase in funding between 2004 and 2008, the fund has later stabilized on a lower amount of just under £120 million per year.

[2] Each region in the UK has its own agencies that fund activities to support universities knowledge transfer initiatives: in England, the Higher Education Funding Council for England (HEFCE) manages the Higher Education Innovation Fund (HEIF); in Wales, the Higher Education Funding Council for Wales allocates the Innovation and Engagement Fund; in Scotland, the Scottish Funding Council is responsible for the Knowledge Transfer grant; and finally in Northern Ireland, the Department for Employment and Learning Northern Ireland (DELNI) manages the Higher Education Innovation Fund (HEIF).

Figure 7: The evolution of HEIF: funding allocation



Source: Authors' elaboration based on data from HEIF reports, available from http://www.hefce.ac.uk/whatwedo/kes/heif/ (last accessed July 2014).

Besides the consolidation of various funds into a single stream, the decade following the introduction of HEIF has also seen a progressive streamlining of the allocation process. First, while initially funds were allocated to universities competitively, on the basis of the proposals that they presented, since 2006 a formula-based system calibrated according to the universities' performance in knowledge transfer has been implemented. This has been justified in terms of a transition from capability building to performance-based funding. The funds, allocated competitively, in the first period of the HEIF (HEIF 1 and HEIF 2), were supposed to help institutions build their knowledge transfer capability, by setting up appropriate infrastructures and developing competences; while the switch to performance based funding was justified on the basis of the intention to reward and encourage excellence in knowledge transfer alongside research and teaching (HEFCE, 2011).

Second, the criteria for measuring performance have become progressively narrower: while HEIF 3 and 4 introduced formula-based funding, this constituted only part of the overall allocation with the remaining still being allocated competitively. Since HEIF 5, the allocation is entirely formula-based.

Since the introduction of formula funding in HEIF 3, the relationship between the HEBCI survey and the HEIF has strengthened, because the information collected in the HEBCI provides the basis for the formula calculation. Moreover, while in HEIF 3 the formula included some element of evaluation of performance in activities not measured by income, starting from HEIF 4 the formula is entirely based on the income that universities accrued from knowledge transfer[3], as shown in Table 1, and the information used for the computations is entirely sourced from the HEBCI.

Table 1: Evolution of HEIF allocation mechanism

		Components		
Year	**Fund**	**Competitive Potential and capacity building**	**Formula Activities not best measured by income**	**Formula External income**
2001-2004	HEIF 1	100%		
2004-2006	HEIF 2	100%		
2006-2008	HEIF 3	45%	10%	45%
2008-2011	HEIF 4	40%		60%
2011-2015	HEIF 5			100%

Source: Authors' elaboration based on data from HEIF reports, available from http://www.hefce.ac.uk/whatwedo/kes/heif/ (last accessed July 2014).

Third, over time a more stringent approach to funds allocation has been used, from granting the funds lump sum (HEIF 1-3) to administering the allocation yearly (HEIF 4, 5). This somehow requires a more strategic approach for universities to plan for their knowledge transfer activities within the specific HEIF period. There has also been a move towards greater concentration of funds, with an increase in the maximum award received by each university (£2.85 million for HEIF 5) and the introduction of a threshold allocation where only university receiving more than £250,000 knowledge

[3] The 100% formula allocation only applies to English universities; the shares of funds allocated through formula are 80% in Northern Ireland, 75% in Wales and 92% in Scotland. Nonetheless, the broad trends described here apply to the policies implemented in all four UK nations.

transfer income are eligible to receive their HEIF funds. Details of the conduct of HEIF allocation are summarised in Table 2.

Table 2: Evolution of the HEIF funding allocation system

	HEIF 1	***HEIF 2***	***HEIF 3***	***HEIF 4***	***HEIF 5***
Year	2001-2004	2004-2006	2006-2008	2008-2011	2011-2015
Total allocation	£77 million	£187 million	£238 million	£396 million	£450 million
Notes:			Up to an additional £20 million to fund a third and fourth year of the 22 Centres for Knowledge Exchange, provided they show satisfactory performance	A fifth and final allocation of £8 million is made available for existing Centres for Knowledge Exchange for the academic year 2008-09	
Minimum allocation	£250,000 overall	£200, 000 overall	£200, 000 overall	£100, 000 per year	No minimum allocation, but move to an external income threshold allocation.
Maximum allocation		£2,400,000	£3,000,000	250% of the previous allocation	£2,850,000
Other constraints			No institution will receive less than 75 per cent of its previous allocation under HEIF 2.	Each HEI is guaranteed 80% of their previous allocation	Maximum allocation constrained to 50% increase No HEI sees its allocation drop more than 50%
Threshold for participation in the HEIF funding scheme	None	None	None	None	£250,000 of knowledge transfer income

Source: Authors' elaboration based on data from HEIF reports, available from http://www.hefce.ac.uk/whatwedo/kes/heif/ (last accessed July 2014).

Summarizing, the instruments used to implement policies in support of universities' knowledge transfer engagement have progressively been narrowed down in scope, through several processes:

- Progressive focusing of the set of indicators used to collect information about universities' knowledge transfer activities on a narrower range of activities, and increased importance of quantitative indicators
- Increased importance of the indicators emerging from the survey as a tool to drive funds allocation, through:
    - Merging of different funds into a single funding stream;
    - Increased allocation of funding through a formula based system rather than a competitive system;
    - Progressive simplification of the formula used, most recently including only income from knowledge transfer.

The figure in Appendix 2 shows the parallel evolution of policy objectives and implementation instruments along a timeline that indicates the main events in chronological order.

5. Conclusions

The case of the policies in support of university knowledge transfer in the United Kingdom illustrates how, over time, a growing gap can open up between the government's increasingly broad and ambiguous objectives and the implementation agencies' use of instruments that are increasingly narrow in scope. We propose a framework that captures the attributes that may enable us to evaluate how the growing gap between policy aspirations and implementation occurs. We highlight that when dealing with complex issues, the definition of policy objectives may tend towards greater breadth and ambiguity over time, as increasing information becomes available and as the number of stakeholders involved expands. This often results in objectives being expressed in increasingly broad, vague and abstract terms, as the government attempts to reconcile different and perhaps conflicting perspectives and interests. The use of ambiguous language can also facilitate decision making on the part of the implementation agencies by making it difficult to assess whether the policy

instruments adopted are actually supporting the objectives or not. At the same time, the implementation builds upon instruments that are increasingly focused on the achievement of measurable outputs, whose scope may narrow over time, for increased practicality, to economize on financial and cognitive resources, and to increase legitimacy by using indicators that appear objective and uncontroversial.

In terms of policy implications, it must be stressed that this study did not aim to assess the relative merits of the government's policy aspirations or of the policies implemented as a consequence; rather, the objective has been to first and foremost highlight the presence of a gap between them, and to explore the possible processes at work. Increasing awareness of the factors that cause this gap could be useful in order to understand when and where such gaps may occur. This may enable the parties to then confront the issue, rather than obscure it behind abstract and vague objectives, on the one hand, and the use of supposedly "objective" indicators, which however are unrelated to those objectives, on the other.

Addressing the gap itself would require careful consideration, commitment and open dialogue on the part of the parties involved. Perhaps one way to begin to address it requires policymakers to adopt a "system thinking" approach and rely upon flexible and versatile instruments, as Kapsali (2011) has highlighted in her work on the interdependencies between policy objectives and implementation instruments. In complex unpredictable contexts, flexibility in achieving a goal is better supported by the concept of equifinality (Gresov and Drazin, 1997), by having different possible trajectories–paths to reach the goal. By doing so, Kapsali (2011) explained that the elements of implementation design can be pieced together into a holistic picture of what has been aspired through the policy objective. Greater consistency between policy objectives and implementation would be obtained not only by mixing different instruments through "policy-mix" approach, especially for a broad policy target (Nauwelaers et al, 2009), but also by better clarifying the rationales behind the combinations (Flanagan et al., 2011). More generally, it would be important for implementation agencies to clarify the characteristics and objectives of the implementation mechanism (Dolfsma and Seo, 2013) by providing some insights on the relevant level of differentiation between the instruments and how they may be coupled with the structure of the policy objectives (Bach et al, 2014).

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